

Watershed: Yuba River – Deer Creek

Years Sampled: 2008-2014

Study Objectives:

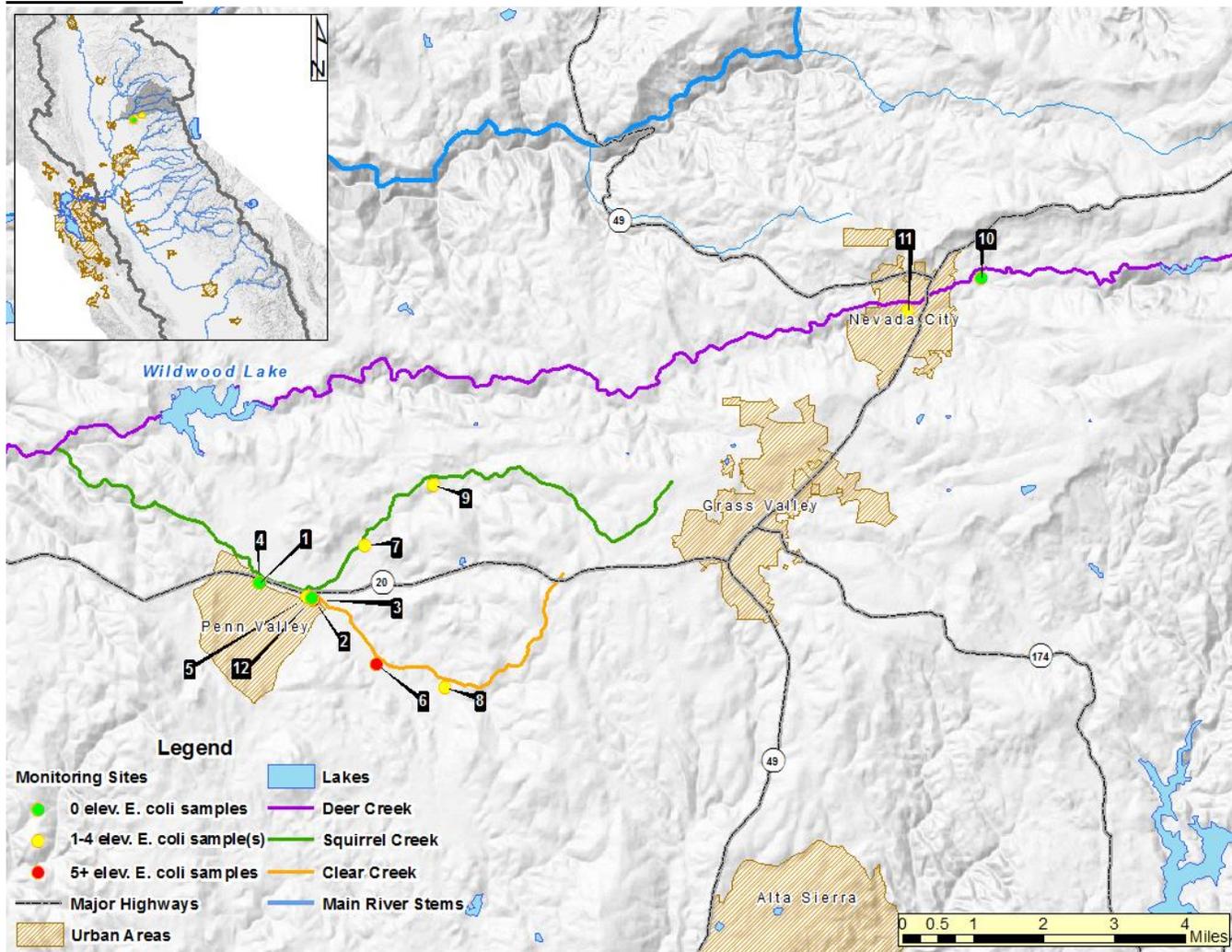
1. Is there any evidence that beneficial uses are being impacted, and if so, what are potential contributors?
2. Are there any noticeable regional, seasonal or trends observed in the water quality data?
3. What are pathogen concentrations at selected monitoring sites?

KEY STATISTICS

Number of sites sampled	12
Sampled by	Water Board Staff (Sac) Sierra Streams Institute
Number of sites sampled for pathogens	7
Number of total samples	263
Sampling Frequency	2x/mo. (May-Sept.)
Assessment Threshold	320 MPN/100 mL

MESSAGE: Nine sites have had one or more samples with elevated *E.coli* and four sites have tested positive for pathogens. Three sites never exceeded the assessment threshold.

Site Locations:



Summary of Results:

Table 1: Field Measurements

Station Code	Map #	Station Name	Oxygen, Dissolved (mg/L)		pH		SpConductivity (uS/cm)		Temperature (°C)		Turbidity (NTU)	
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
516NEV906	1	SC in Western Gateway Park	7.01	12.03	7.24	8.50	52.0	228.0	11.23	22.37	0.45	11.70
516NEV907	2	CC above confluence with Squirrel Creek	7.62	10.94	7.45	8.03	109.0	265.0	11.01	21.85	0.50	21.30
516NEV908	3	SC above confluence with Clear Creek	8.24	12.17	7.33	8.04	61.0	218.0	10.70	21.50	0.40	10.40
516NEV909	4	SC downstream of swimming hole	9.49	10.14	7.44	7.87	168.0	171.0	11.50	15.83	1.46	2.19
517NEV101	5	SC at Creekside Village Mobile Home Park	8.12	15.31	7.04	7.88	68.2	194.0	10.98	19.90	0.50	11.40
517NEV102	6	CC at Lazy Valley Road	5.87	10.36	7.15	8.01	130.9	257.9	11.60	20.00	0.12	3.10
517NEV103	7	SC at Valley Drive	5.57	14.03	7.09	8.07	52.4	192.0	11.80	19.40	0.75	11.60
517NEV104	8	CC at Long Valley Road	7.05	11.16	7.73	8.44	261.0	468.8	11.20	22.80	0.05	22.70
517NEV106	9	SC at Rough and Ready HWY and Rex Reservoir Road	5.59	13.54	6.88	7.87	70.4	191.0	11.14	18.00	1.70	15.90
517NEV112	10	Deer Creek near Willow Valley Christmas Tree Farm	9.58	10.27	6.38	6.95	28.7	41.9	10.60	13.60	0.10	0.80
517NEV113	11	Deer Creek below S Pine Street	9.90	10.96	6.49	7.11	31.0	45.8	10.10	13.10	0.30	0.85
517SCBCCx	12	SC below Clear Creek	9.65	9.65	7.76	7.76	99.0	99.0	15.38	15.38	1.30	1.44

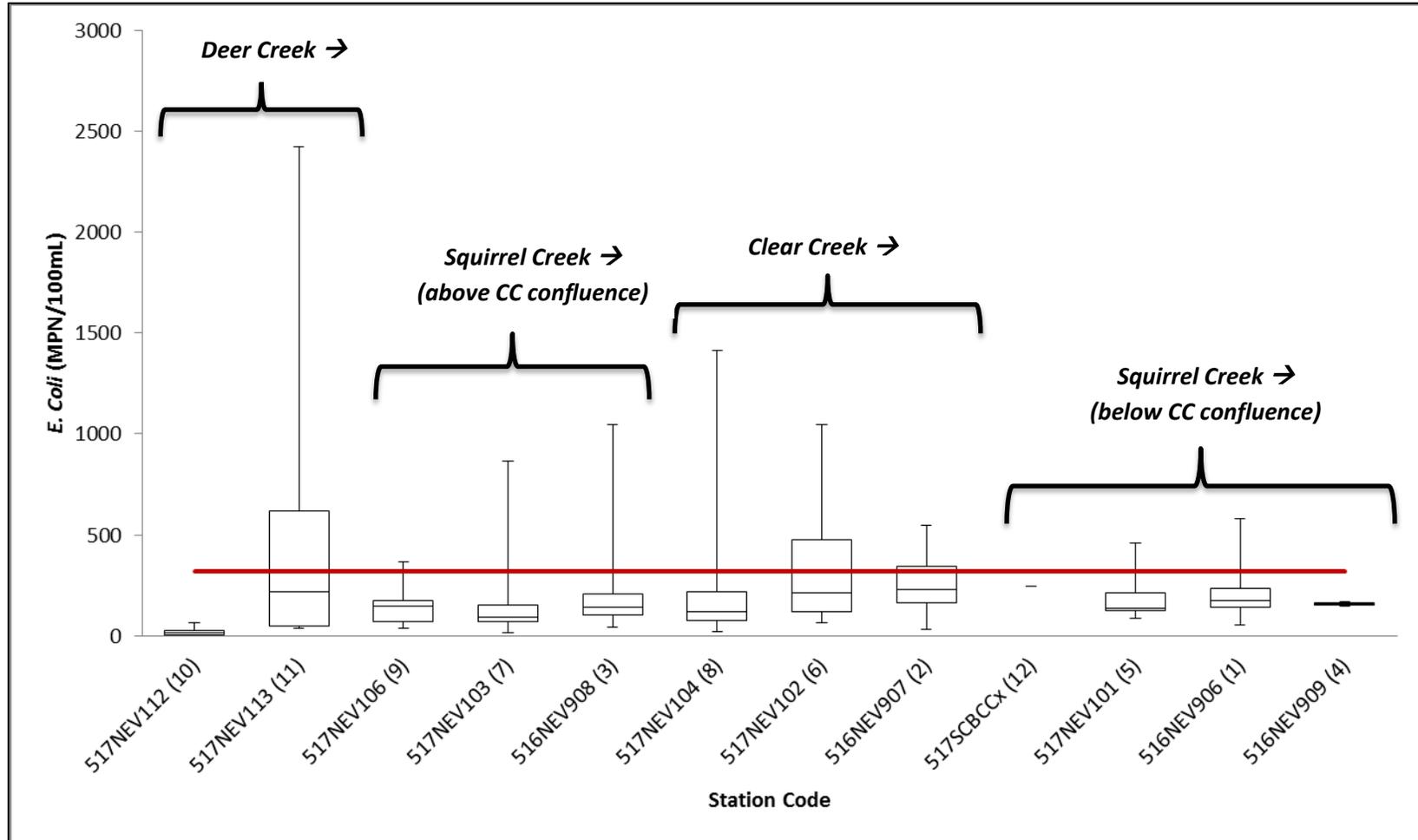
SC: Squirrel Creek, CC: Clear Creek, NR: Not Recorded

Table 2: *E. coli* and Pathogen Results

Map #	<i>E. coli</i> (MPN/100mL)					<i>Cryptosporidium</i> (cysts/L)			<i>Giardia</i> (oocysts/L)			<i>Salmonella</i> (MPN/100mL)			<i>E.Coli</i> O157:H7 (Presence/Absence)		
	Mean	Min	Max	Count	>320	Max Result	Count	(+)	Max Result	Count	(+)	Max Result	Count	(+)	Result	Count	(+)
1	189.4	54.6	579.4	39	1	0.1	11	4	0.1	11	2	2.2	11	9	Present	11	4
2	257.8	30.5	547.5	29	10	0.1	2	1	0.2	2	1	Not Detected	2	0	Not Detected	2	0
3	207.9	45.2	1046.2	29	4	Not Detected	2	0	0.3	2	1	Not Detected	2	0	Not Detected	2	0
4	157.7	148.3	167.0	2	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
5	182.3	88.0	461.1	17	2	NA	0	0	NA	0	0	NA	0	0	NA	0	0
6	344.5	63.1	1046.2	16	7	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
7	167.6	16.0	866.4	17	3	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
8	275.1	23.1	1413.6	17	4	Not Detected	1	0	Not Detected	1	0	Not Detected	1	0	Not Detected	1	0
9	147.9	36.4	365.4	8	1	0.2	1	1	0.6	1	1	Not Detected	1	0	Not Detected	1	0
10	19.4	2.0	66.3	8	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
11	595.4	37.3	2419.6	8	3	NA	0	0	NA	0	0	NA	0	0	NA	0	0
12	248.1	248.1	248.1	1	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0

E. coli - Highlighted Cells: Exceeds EPA Guidline of 320 MPN/100ml Pathogens- (+): positive result, Highlighted Cells: positive results, NA: Not Applicable

Graph 1: E Coli Results



10,11 = progressive DS flow along Deer Creek (in Nevada City); 9,7,3 = progressive DS flow along Squirrel Creek (above confluence with Clear Creek);
 8,6,2 = progressive DS flow along Clear Creek (above confluence with Squirrel Creek);
 12,5,1,4 = progressive DS flow along Squirrel Creek (below confluence with Clear Creek)

WHAT IS THE MEASURE SHOWING?

Flowing within the Sierra Nevada foothill communities of Nevada City, Grass Valley, Penn Valley, and Lake Wildwood, Deer Creek is a sub-watershed of the Yuba River. Its tributaries from the south, Clear Creek and Squirrel Creek, drain in a general northwest direction and join with the lower end of Deer Creek. Field measurements for each site are shown in Table 1.

Results show that nine sites exhibited elevated levels of *E. coli* in the Deer Creek watershed on one or more occasions (shown in Table 2). There were 35 samples with elevated levels out of 191 samples, or 18.3%. The highest concentration (2419.6 MPN/100 mL) occurred along Deer Creek below S Pine Street (11). This site and Clear Creek at Lazy Valley Road (6) have an average above the recommended EPA guideline (320 MPN/100 mL). While there were detections at nine sites (shown in Graph 1), their occurrences were fewer relative to the sample count for sites along Squirrel Creek. Detections along the main stem were rarer as well.

The watershed is primarily forest (Jin et al., 2013), yet potential non-point and urban sources are abundant. It is heavily utilized for recreational activities, and is home to numerous waterfowl and other wildlife. Further study is needed to identify specific sources.

Seven sites in the Deer Creek watershed were sampled for pathogenic *E. coli* O157:H7, *Cryptosporidium*, *Giardia*, and *Salmonella*. Four of the sites tested positive for pathogens (shown in Table 2). There are currently no water quality objectives for these constituents.

WHY THIS INFORMATION IS IMPORTANT?

In 2012, the USEPA amended recreational water quality guidelines for human health under the Clean Water Act, specifying the standard threshold value (STV) for the indicator bacteria *E. coli* as 320 colony-forming units (CFU) per 100 milliliters (mL). The STV represents the 90% percentile of the water quality distribution, beyond which the water body is not recommended for recreation (Nappier & Tracy, 2012).

E. coli is an indicator of potential fecal contamination and risk of illness for those exposed to water (e.g. when swimming). Since *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern, the data collected from this study provide more information on pathogen indicators as well as specific water-borne pathogen concentrations to better assess their impact on the beneficial use of recreation and to identify potential contributors by sub watershed.

WHAT FACTORS INFLUENCE THE MEASURE?

E. coli and specific water-borne pathogens can come from human or animal waste and may be highly mobile and variable in flowing streams. In addition to human recreational use, the presence of pathogens in water may be the result of cattle grazing, wildlife, urban and agricultural runoff, or sewage spills. The physical condition of the watershed may also influence pathogen measurements, however in this study field measurements (temperature, SC, DO, turbidity and pH) were variable between sites and it is unclear if these constituents had an effect on the *E. coli* or pathogen measurements.

TECHNICAL CONSIDERATIONS:

- Data available at: CEDEN
- *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern.
- Public reports and fact sheets are available at:
http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_water_ambient_monitoring/swamp_regionwide_activities/index.shtml

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